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An Assessment of Subject coverage of Scientometrics from 2001 to 2010

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Abstract

The study has categorised 1241 articles into research and non-research articles, for analysing subject coverage, publication trend and prolific author of the journal *Scientrometrics* from the period 2001 to 2010. All articles were classified under 22 subjects using non-parametric method. The study found a sharp positive growth in research articles over the period while a negative growth has been observed in non-research articles only. Most of the research articles were devoted to Bibliometric Study, Citation Studies, Research Output, Collaboration Analysis, while the major topic for non-research articles were Bibliometric study, patent analysis, statistics and research assessment over the period. The most prolific author of the period (2001-2010) was Glanzel, W. (*Wolfgang Glänzel, Katholieke University Leuven, Belgium)*.

Keyword: Scientometrics, Subject coverage, Prolific Author, Academic Journal, Research article, Non-research article

1. Introduction

Academic-scientific journal carries out original studies. It is an outstanding channel of communication and publishing research. Journal highlights the critical issues of different branch of knowledge. Investigation on scientific research published in a journal reveal the evolution, state-of-the-art, theoretical base, maturity and future directions of a subject. The journal '*Scientometrics*' is transcendent in the field of Scientometrics that is a branch of Library and

Information Science. The full title of the journal is '*Scientometrics: An International Journal for All Quantitative Aspects of the Science of Science and Science Policy*'. It has been started by Tibor Braun in Hungary and the first issue was published by Elsevier Science Publishing Company, Amsterdam and Akadémiai Kiadó, Budapest in 1978. Now, it has completed its grand 39 years covering scientific activity in print and electronic media.

As a subject Scientometrics is concerned with the quantitative features and characteristics of science and scientific research. It emphasises on the investigations in which the development and mechanism of science are studied using statistical and mathematical methods. The aim of the *Scientometrics* journal is to bring the results of such investigations together in one place. The journal publishes original studies, short communications, preliminary reports, review papers, letters to the editor, and book reviews on Scientometrics. Due to its fully interdisciplinary character, the journal is indispensable to research scholars, and research administrators. It provides valuable assistance to Library Professionals and Information Scientist in central scientific agencies, ministries, research institutes, and laboratories.

The present study is based on bibliometric approach which uses quantity characteristics, attributes of object of documentary communication. It analyses bibliographic data of publications. The worldwide scholars applied their intellectuality to explore the complete picture of a discipline applying existing bibliometric indicators and framing new indicators. Thus, this study took place to estimate the worldwide of productivity of ongoing research in field of Scientometric through the journal '*Scintometrics*'. The objectives of the study are to determine trend of research and non-research articles, trend of subject, and prolific author over the period.

2. Review of Literature

The growing maturity of a subject can be revealed by analysis of published articles in journals. Some related studies have been reviewed to know the approaches that have been made in last two decades.

Nour's study (1985) examined 1404 articles of forty-one selected LIS core journals published in 1980 to revel the adopted methodology of published articles. She classified all articles by subject and categorised them under two broader category- research articles and non-research articles. She also analyzed references, endnotes, and bibliographies. She found that the amount of article

publication increased over the year, but the proportion of research articles decreased since 1975. Feehan, et al. (1984) analysed issues and trends of the research published in 91 English-Language journals devoted to Library and Information Science discipline during 1984. They selected substantive articles and then recorded basic bibliographic information for each research article. The researchers classified each article as either research or non-research and further each of these articles was also classified by employed research method, subject, type of library studied and analytical method used. They found Library and Information Science multifaceted in the research methods and covered various facets of LIS during the studies period.

Koufogiannakis, Slater and Crumley (2004) assess 217 LIS Journals on the basis of given inclusion criteria in the paper and included 91 peer-reviewed LIS journals which contain 2644 articles. Of these, only 807 were research articles that fall under the LIS domain. They studied the subject coverage of the articles and they found that Information Access and Retrievals, Management, Education, Reference, Library Professional's issues and History of Library were the major areas of LIS domain.

Tigga, Lihitker and Rajyalakshmi (2005) conducted a content analysis of 33 issues of '*DESIDOC Bulletin of Information Technology*' published during January 1997 to July 2002. It reveals Information Technology, Bibliographic Databases, and Collection Development were the largest coverage topics. Mukherjee (2009) analysed 17 open access published uninterruptedly journals of the period 2001-2004 for studying subject coverage of open access journals and found that these journals have very vast subject coverage and almost all facets of Library and Information Science was covered. He also concluded that open access journals were also found as a most viable media for scholarly communication.

Various scholars used content analysis method to identify subject coverage of journals such as: Järvelin and Vakkari (1993) analysed 950 articles form Core LIS journals during 1965 to 1985 and found Information Storage, and Information Retrievals were the focused topic of the period. Kajberg (1996) conducted a content analysis of literatures published in two LIS journals in Denmark during 1957-1986. The result of the analysis revealed strong concerns with Librarianship and Action, and current events-oriented topics such as Co-operation, Network and Resource Sharing; whereas the theoretical aspects of Librarianship and Information science have received scant attention.

Koufogiannakis, Slater and Crumley (2004) examined 2644 articles of 91 peer-reviewed journals of Library and Information Science and only 807 of them categorised as research articles. The researchers found that Information access and retrievals, Management, LIS Education, Reference, Library professionals' issues and History of library were the major areas of Library and Information Science domain.

Mukherjee (2009) analyzed 17 uninterruptedly published open access journals of the period 2001-2004 for studying subject coverage of open access journals. He found that these journals had very vast subject coverage and almost all facets of Library and Information Science were covered. Tuomaala, Järvelin and Vakkari (2014) examines the subject coverage of LIS research from 1965 to 2005 in light of comparable data sets for 1965, 1985, and 2005 and found that Information Retrieval was the most popular area of research over the years.

3. Dataset and Methodology

A set of document used for the study consists of 1241 full-text of journal articles, published in the year 2001 to 2010 in the *Scientometrics* journal. A journal article has been defined as an article appearing in a journal, with exception of editorials, letter to editor, comments on letter to editor, reminiscences, feature report, news items, columns, historical notes, book reviews, book list, bibliographies, short communication, world flash, opinion, conference report, correction and obituaries etc. (Enger et al., 1989). In the perspective of these objectives, all selected articles published in Scientometrics are the unit of analysis and each of them was examined and categorised into research and non-research articles (Walia and Kaur, 2012; Dilevko, 2007; Koufogiannakis, D. Slater and Crumley, 2004). The functional definitions of research and non-research article (Agrahari, 2017) are adopted for the study:

3.1 Research Article

Research article is any article that deals with primary data and carried out by systematic investigation and contribute either to conceptual framework or provide new primary data or new technique/model, and includes introduction, background of study or literature review, objectives, hypothesis, Methodology, tools for analysis, result or data analysis and findings, discussion, reconditions and references or bibliography as body of articles.

3.2 Non- Research Article

The journal articles which do not come under the level of a research article, contain the knowledge already existing in public domain and don't report any original idea and technique have been considered as Non-Research Articles such as review article, Informative article, evaluative article, project reports etc.

In the light of objective, subject coverage of research and non-research articles, and prolific author of the period has been studied. Scholar has assigned subject to each article on the basis of abstract, keywords and content, in a non-parametric way. Each article was assigned to only one subject category on the basis of emphasis or perceives intent of the article. For conducting the study, the content of each article or paper was scanned and the relevant information (Title of Article, Type of article, Subject of the article, Year of publication, Name of author and co-author, Volume and issue No.) recorded in a spreadsheet and analysed.

4. Data Analysis

The data belong to the subject of research and non-research articles published in *Scientometrics* presents the choice of the subject of scholars engaged in publication from the period 2001 to 2010 in Scientometrics discipline have been discussed. There are a total of 22 subjects has been identified under which all articles are grouped (See Table 2 & 3).

4.1 Distribution of Research and Non-Research Articles

The distribution of research and non-research articles of *Scientometrics* journal of the studied period (2001-2010) are presented in Table 1. There are a total of 1165 (93.90%) research articles and 76 (6.12%) non-research articles.

Table 1: Distribution of research and non-research articles of S*cientometrics*

Years	Journal's Articles				Total Articles
	Research		Non-Research		
	No.	%	No.	%	
2001	73	82.95	15	17.05	88
2002	75	93.75	5	6.25	80
2003	77	93.90	5	6.10	82
2004	81	93.10	6	6.90	87

2005	84	91.30	8	8.70	92
2006	140	95.24	7	4.76	147
2007	117	95.12	6	4.88	123
2008	122	95.31	6	4.69	128
2009	177	94.15	11	5.85	188
2010	219	96.90	7	3.10	226
Overall (2001-2010)	1165	93.90	76	6.10	1241

Data Source: *Primary data*

A big gap has been found between the number of published research and non-research articles. In context of research articles, a steep uptrend line can be seen in Figure 1 which indicates the constant growth of research articles during the period. While a slight downtrend line for non-research articles can be observed in Figure 1. The largest number of non-research articles published in 2001 was 15 (17.05%) articles. After that the publication share of non-research articles shrank and reached to 3.10%.

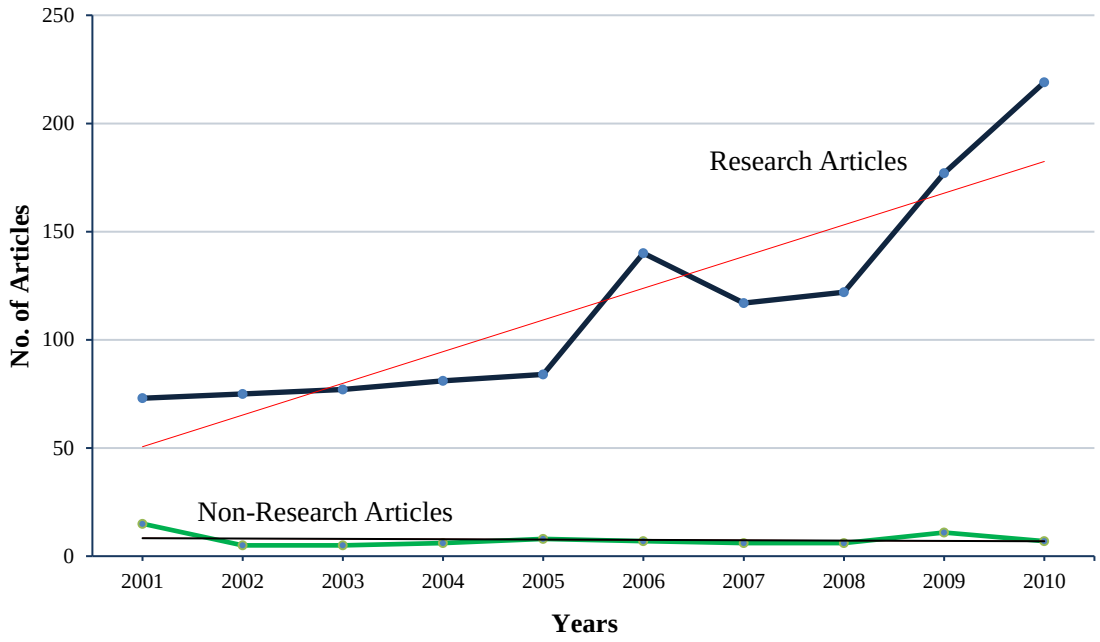

Figure 1: Distribution of research and non-research articles of *Scientometrics*

Data Source: *Primary data*

4.2 Subject wise Distribution of Research Articles

Table 2: Distribution of research articles of *Scientometrics* by Subject

S. No.	Subjects	Research Articles in							
		2001-2004		2005-2007		2008-2010		2001-2010	
		No.	%	No.	%	No.	%	No.	%
1	Academic Ranking	0	0.00	2	0.59	8	1.54	10	0.86
2	Authorship Analysis	19	6.21	11	3.23	18	3.47	48	4.12
3	Bibliometric Study	38	12.42	55	16.13	83	16.02	176	15.11
4	Citation Analysis	72	23.53	65	19.06	86	16.60	223	19.14
5	Collaboration Analysis	29	9.48	18	5.28	41	7.92	88	7.55
6	Demographic Study	5	1.63	3	0.88	14	2.70	22	1.89
7	Impact Factor	8	2.61	12	3.52	20	3.86	40	3.43
8	Informetrics	3	0.98	3	0.88	0	0.00	6	0.52
9	Innovation system	1	0.33	3	0.88	1	0.19	5	0.43
10	Journal Evaluation	3	0.98	2	0.59	5	0.97	10	0.86
11	Mapping of Science	2	0.65	3	0.88	8	1.54	13	1.12
12	Model	8	2.61	5	1.47	3	0.58	16	1.37
13	Network Analysis	7	2.29	9	2.64	17	3.28	33	2.83
14	Patent Analysis	10	3.27	20	5.87	24	4.63	54	4.64
15	Research Assessment	6	1.96	14	4.11	19	3.67	39	3.35
16	Research Output	23	7.52	29	8.50	48	9.27	100	8.58
17	Scholarly Publication	12	3.92	11	3.23	27	5.21	50	4.29
18	Scientometrics	15	4.90	23	6.74	25	4.83	63	5.41
19	Statistics	6	1.96	1	0.29	3	0.58	10	0.86
20	Text mining	4	1.31	15	4.40	25	4.83	44	3.78
21	Triple helix	2	0.65	2	0.59	3	0.58	7	0.60
22	Webometrics	17	5.56	10	2.93	19	3.67	46	3.95
	Miscellaneous	16	5.23	25	7.33	21	4.05	62	5.32
	Total	306	100	341	100	518	100	1165	100

Data Source: *Primary data*

The Subject-wise distribution of research articles published in *Scientometrics* is tabulated in Table 2. The table reveals the highest number of articles that is 72 (23.5%) were published on the subject Citation analysis during the year 2001-2004, followed by Bibliometric Study with 38 (12.4%) articles and Collaboration Analysis with 29 (9.5%) articles. The other subject major subjects which cover 167 (41%) research articles are Research output with 23 (7.5%) articles, Authorship Analysis with 19 (6.2%) articles and Webometrics with 17 (5.7%) articles, Scientometrics with 15 (4.9%) articles and Scholarly Publication with 12 (3.9%) articles.

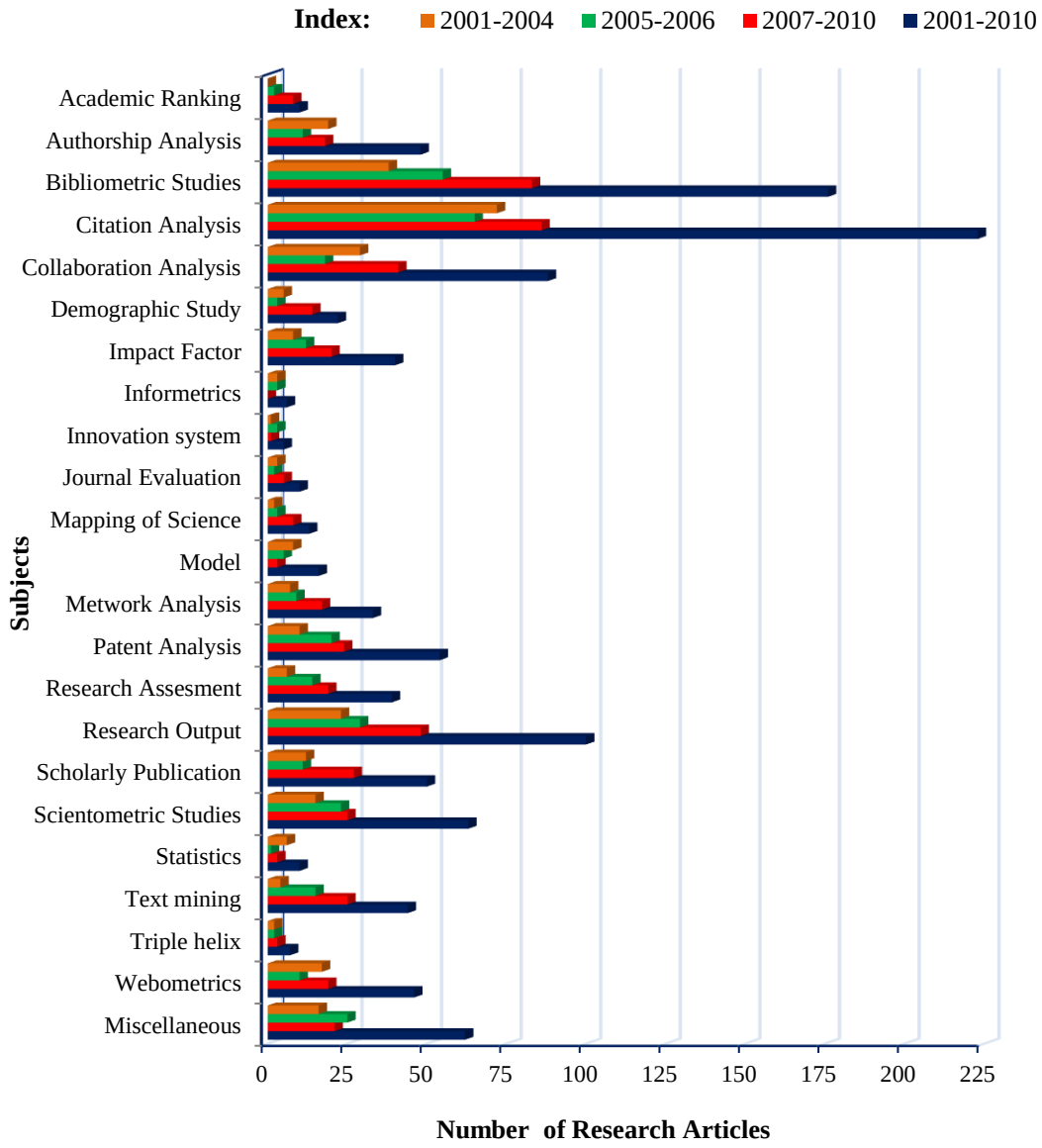

Figure 2: Distribution of ressearch articles of *Scientometrics* by Subject

Data Source: *Primary data*

Table 2 shows that a total number of 65 (19.1%) research articles were contributed on the subject Citation analysis during 2005-2007 that is highest number of articles to a subject but lesser in comparison to the number of research articles published in 2001-2004 and 2007-2010. The subject Text Mining with 11 articles, Patent Analysis with 10 articles, Scientometrics with 8 articles and Research output with 6 articles got more coverage. While the subject Collaboration analysis, Authorship Analysis, Webometrics did not cover the number of research articles as well as covered in previous period (2001-2005). In the period 2007-2010, most of the subject attracted good number of research articles in comparison to previous period.

Overall, It could be noticed during the period 2001-2010, the subject Citation Analysis become the most popular subject for the contributors of *Scientometrics* journal where it covered 19.1% of the total research articles. It was also found the subject Bibliometric Study covered 15.1% of total research followed by Collaboration analysis (7.6%) and Scientometrics (5.4%). The subject patent analysis, Scholarly publication, Authorship analysis and Webometrics received equal attention and contributed 198 (17.00%) articles. It also can be observed that the subjects listed in Table 2 gain more articles gradually over the whole period.

4.3 Subject–wise Distribution of Non-research Articles

Table 3: Distribution of non-research articles of *Scientometrics* by subject

S. No.	Subjects	Non-research Articles in							
		2001-2004		2005-2007		2008-2010		2001-2010	
		No.	%	No.	%	No.	%	No.	%
1	Academic Ranking	0	0.00	0	0.00	0	0.00	0	0.00
2	Authorship Analysis	1	3.33	0	0.00	0	0.00	1	1.33
3	Bibliometric Study	2	6.67	8	38.10	7	29.17	17	22.67
4	Citation Analysis	2	6.67	1	4.76	1	4.17	4	5.33
5	Collaboration Analysis	2	6.67	0	0.00	0	0.00	2	2.67
6	Demographic analysis	1	3.33	0	0.00	0	0.00	0	0.00
7	Impact Factor	2	6.67	1	4.76	1	4.17	4	5.33
8	Informetrics	1	3.33	1	4.76	0	0.00	2	2.67
9	Innovation System	0	0.00	1	4.76	0	0.00	1	1.33
10	Journal Evaluation	0	0.00	0	0.00	0	0.00	0	0.00
11	Mapping of Science	1	3.33	0	0.00	0	0.00	1	1.33
12	Model	1	3.33	1	4.76	0	0.00	2	2.67
13	Network Analysis	0	0.00	0	0.00	0	0.00	0	0.00
14	Patent Analysis	4	13.33	3	14.29	5	20.83	12	16.00
15	Research Assessment	1	3.33	2	9.52	2	8.33	5	6.67
16	Research Output	0	0.00	1	4.76	1	4.17	2	2.67
17	Scholarly Publication	2	6.67	0	0.00	0	0.00	2	2.67
18	Scientometrics	1	3.33	0	0.00	4	16.67	5	6.67
19	Statistics	7	23.33	1	4.76	1	4.17	9	12.00
20	Text Mining	0	0.00	1	4.76	0	0.00	1	1.33
21	Triple Helix	1	3.33	0	0.00	2	8.33	3	4.00
22	Webometrics	0	0.00	0	0.00	0	0.00	0	0.00
	Miscellaneous	2	6.67	0	0.00	0	0.00	2	2.67
	Total	31	100	21	100	24	100	76	100

Data Source: *Primary data*

Table 3 shows the subject coverage of non-research articles. It reveals that there are only 30 articles in the period 2001-2004, out of which 11 (36.9%) articles were published on Patent analysis, and Statistical analysis. The rest 19 (63.1%) articles fell under twelve subjects.

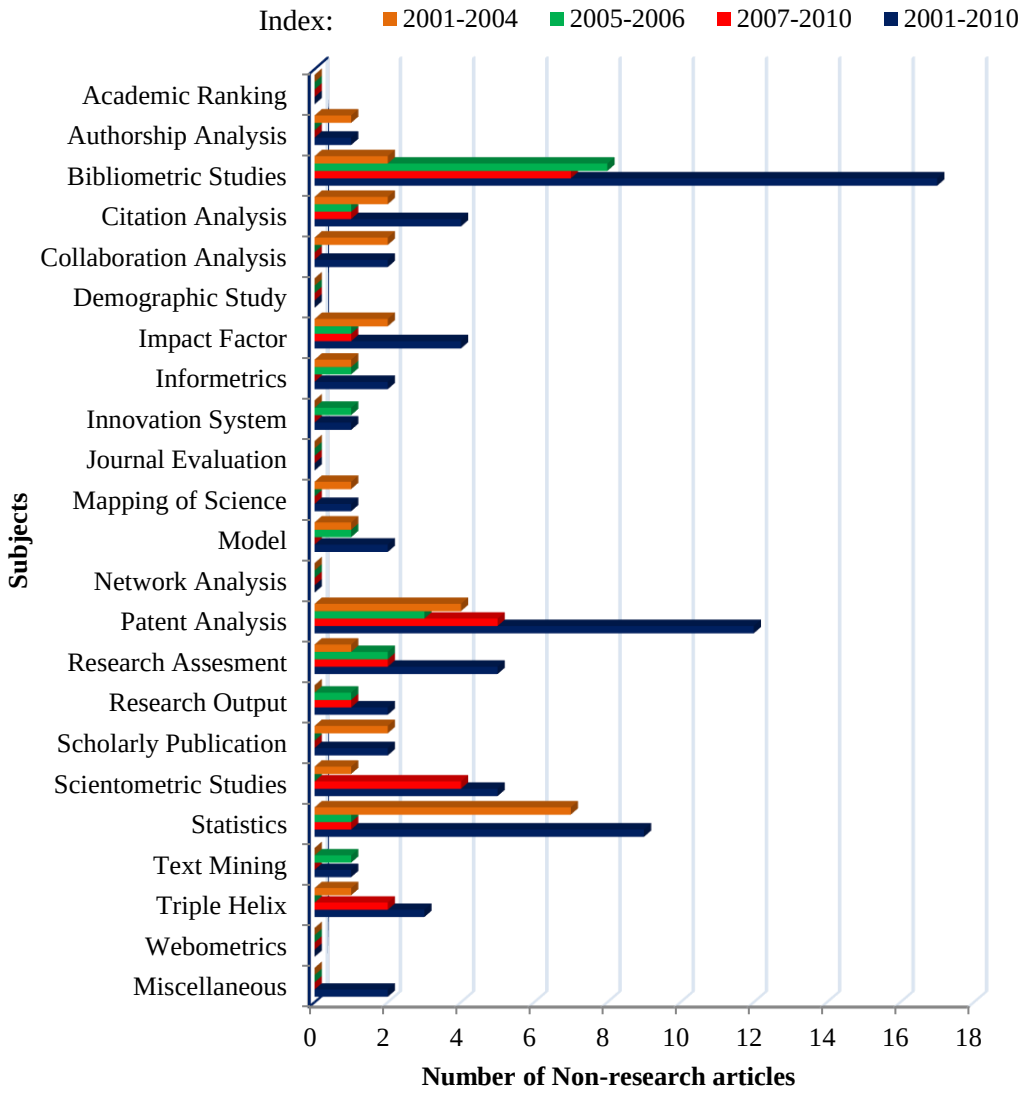

Figure 3: Distribution of non-research articles of *Scientometrics* by subject

Data Source: *Primary data*

In the period 2005-2007, the number of non-research articles decreased to 21 articles. In this period the attention of scholar were Bibliometrics, and Patent analysis which contributed 8 (38.1%) and 3 (14.3%) articles respectively. The remaining 9 (47.6%) articles fell in the nine subjects listed in the Table 3.

During the next period 2007-2010, 16 (66.7%) out of 24 articles were published on Bibliometric Study (seven articles), Patent Analysis (five articles) and Scientometrics (four articles). Other 8 (33.3%) articles were written on six subjects and they are Triple Helix, Research Assessment, Research Output, Statistics, Impact Factor and Citation Analysis. It can be observed from Figure 3 that the subject Academic Ranking, Webometrics, Network Analysis and Research Evaluation did not attract attention of scholars for non-research article.

It could also be noticed that the subject group Bibliometrics Studies, Patent Analysis and Statistics were the first choice of the scholars for non-research articles throughout the period (2001-2010). However, Citation Studies, Research Assessment, and Impact Factor were also among the subject that gained non-research article during studied period.

4.4 Prolific Author of Scientometrics

The study also identifies the most productive authors of *Scientometrics* Journal during the year 2001-2010. There are 1547 unique authors in Scientometrics. The most frequently appeared primary authors are Glanzel, W. (*Wolfgang Glänzel, Katholieke University Leuven, Belgium)* followed by Garfield, E. (*Eugene Garfield, died on 26 Feb. 2017)*, and Leydesdorff, L. *(loet leydesdorff, University of Amsterdam, Netherlands*) and so on (see Table 3).

Table 4: Most frequently appeared primary authors in *Scientometrics*

Rank	Name	Frequency
1	Glanzel, W.	25
2	Garfield,.E.	23
3	Leydesdorff, L.	12
4	Egghe, L.	11
5	Moed, H.F.	9
5	Thelwall, M.	9
5	Vanraan, A.F.J.	9
5	Meyer, M.	9
6	Schubert, A.	8
6	Braun, T.	8
7	Narin, F.	7
7	Rousseau, R.	7
7	Small, H.	7
7	Zitt, M.	7
7	Cronin, B.	7

Data Source: *Primary data*

Whereas the most productive co-author is Rousseau, R. (*Ronald Rousseau, Katholieke University Leuven, Belgium*) followed by Glanzel, W. (*Wolfgang Glänzel, Katholieke University Leuven, Belgium),* Debackere, K. (*Koenraad Debackere, Katholieke University Leuven, Belgium),* and so on (see Table 4). It also have been observed that 34% articles have been written by only four author that are Ganzel, W., Garfield, E., Rousseau, R. and Leydesdorff, L.

Table 5: Most frequently appeared co-authors in *Scientometrics*

Rank	Name	Frequency
1	Rousseau, R.	20
2	Glanzel, W.	19
3	Debackere, K.	13
3	Ho, Y.P.	13
3	Thelwall, M.	13
3	Thijs, B.	13
4	Meyer, M.	11
4	Schubert, A.	11
5	Wilson, C.S.	10
6	Daniel, H.D.	8
6	Van Leeuwen, T.N.	8
7	D'Angelo, C.A.	7
7	Leydesdorff, L.	7
7	Markpin, T.	7
7	Moed, H.F.	7

Data Source: *Primary data*

5. Findings & Conclusion

In the present study, subject coverage of research and non-research articles published under well established journal '*Scientometrics'* has been analysed. The study observed a sharp uptrend line for research articles which indicates a positive growth over the period (2001-2010). The proportion of research articles was always found larger to the non-research articles. While the growth of non-research articles was declining since 2001 and the share of the articles reached to 6 % (in the year 2010) from 17% (in the year 2001) of total published articles.

In term of subject coverage of articles, it has been found that 49% of the research articles concentrated on only five subjects (Bibliometric study, Citation studies, Collaboration analysis, Research output, Scientometrics). It is found that approximately 65% of non-research articles fall

under the five subjects that are Bibliometrics study, Patent analysis, Statistics, Research assessment, and Scientometrics.

The study identified most prolific primary author of research article is The most prolific primary author of the period is Glanzel, W (*Wolfgang Glänzel, Katholieke University Leuven, Belgium*) followed by Garfield, E. (*Eugene Garfield, died on 26 Feb. 2017*), and Leydesdorff, L (*loet leydesdorff, University of Amsterdam, Netherlands*).While the most prolific secondary author (Co-authors) of the period is Rousseau, R. (*Ronald Rousseau, Katholieke University Leuven, Belgium*), followed by Glanzel, W. (*Wolfgang Glänzel, Katholieke University Leuven, Belgium)*, Debackere, K (*Koenraad Debackere, Katholieke University Leuven, Belgium).*

Thus it can be said that the Scientometrics journal is dominated by research articles. The subjects Bibliometric study, Citation studies, Collaboration analysis, Research output, Scientometrics are dominant subject over the year. The scholar Glanzel, W. (*Wolfgang Glänzel, Katholieke University Leuven, Belgium)* became the most prolific author over the period.

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